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AUTHOR Niyekawa-Howard, Agnes M.
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ABSTRACT

The linguistic relativity hypothesis is the view that the language a person speaks influences his perception of the world. This hypothesis is frequently misunderstood to be a question of the influence of language on culture, when in reality it emphasizes the influence of language on the cognition of its speakers. This distinction between culture and cognition needs to be made clear, since the time dimension is different; the relationship between language and culture is diachronic, whereas that between language and cognition is synchronic. Lately, the hypothesis of linguistic relativity has lost influence because of the growth of interest in linguistic universals. Acceptance of one does not dictate rejection of the other, in that the two deal with language at different levels of abstraction. Experiments conducted to test the hypothesis of linguistic relativity have contributed to its loss of credibility, in that they have contained conceptual and methodological shortcomings. However, certain psychological concepts, such as selectivity and distortion in perception, offer sound support for the hypothesis. For future use, the hypothesis needs to be restricted in definition, emphasizing that language is only one of many factors influencing individual perception and cognition. (LG)

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DEPARTMENT OF LINGUISTICS
UNIVERSITY OF HAWAII
HONOLULU 96822

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THE CURRENT STATUS OF THE LINGUISTIC RELATIVITY HYPOTHESIS

Agnes M. Niyekawa-Howard

0. Introduction

The linguistic relativity hypothesis -- variously known as the Whorfian hypothesis, the Whorf-Sapir hypothesis or the linguistic Weltanschauung hypothesis -- is the view that the language a person speaks influences his perception of the world. There are two facets to the hypothesis: (1) "that the world is differently experienced and conceived in different linguistic communities," and (2) "that language is causally related to these psychological differences" (Brown & Lenneberg, 1954).

The linguistic relativity hypothesis has had a long history with several high points of interest in the academic community. It goes back at least as far as Wilhelm von Humboldt (cf. Fishman, 1960), who was instrumental in establishing the field of ethnolinguistics a century ago. In the late 1920's and throughout the decade of the thirties, the hypothesis reached another peak with the work of Edward Sapir and Benjamin Lee Whorf, which dealt heavily with the language - culture - world view relationships.

After a period of dormancy, interest in the hypothesis was revitalized in the early 1950's, coinciding with the establishment of psycholinguistics as a separate field within the social sciences. The hybrid vigor in this instance resulted from the wedding of psychology and linguistics, while previous developments arose from the concerns of anthropologist-linguists. The group responsible for stimulating interest in the hypothesis among psychologists was the Social Science Research Council Committee on Linguistics and Psychology.

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Research studies to test the linguistic relativity hypothesis, using rigorous scientific methods, were first introduced by those associated with this original group. These studies kindled the interest of a wide range of scholars outside the group, from philosophers to language teachers. The hypothesis was interpreted and reinterpreted in a number of different ways, theories were developed, experiments carried out, methodology systematized, and suddenly, after all the fanfare, interest in the hypothesis among psychologists seems to be dying out. Or rather, there appears to be a withdrawal response on the part of those once interested in the linguistic relativity hypothesis under the impact of the generative-transformational theory of linguistics, which emphasizes language universals.

This paper will review the various views of the linguistic relativity hypothesis, and attempt to clarify its relationship to linguistic universals. It will point out some of the conceptual and methodological shortcomings found in most studies that have attempted to test the linguistic relativity hypothesis so far, and redefine the hypothesis to a psychologically meaningful one.

1. The relation of language, culture and cognition

The linguistic relativity hypothesis is frequently misunderstood to be a question of the relationship between language and culture. The hypothesis, however, emphasizes the influence of language on the perception and thought of its individual speakers, rather than its influence on culture. Thus when there are cultural correlates of some linguistic features, whether culture influenced language or language influenced culture should not concern us. The distinction between the effect of language on the individual's perception and cognition, on the one hand, and on culture, on the other hand,

needs to be made clear, as the time dimension under consideration is different in these two cases. The study of the relationship of language and culture is essentially a diachronic one in that it deals with change over history. Change in one is frequently accompanied by change in the other, the changes occuring sequentially, first in culture and then in language, or vice versa, but not simultaneously. Dell Hymes (1964) points out the importance of this distinction and states, "Semantic patterns, whatever their role in present perception and cognition, reflect past acts of perception and cognition, which, collectively repeated and approved, have passed from individual experience into cultural habit" (p.118).

The linguistic relativity hypothesis, however, is a "mold" theory that says language is a mold into which infant minds are poured (Brown & Lenneberg, 1954). The infant is born into an already existing linguistic community and learns the language spoken around him. It is through this language that he will structure and organize what he sees and experiences. Thus the linguistic relativity hypothesis deals with an individual's lifetime, actually only with the formative years of the individual as far as language influence is concerned, and thus is essentially a synchronic problem.

The relationship between language and culture, however, is not irrelevant to the linguistic relativity hypothesis. It enters into the picture by making it methodologically difficult to separate the effect of language on the individual from the effect of culture, since the two reinforce each other. For instance, a change in the economic system is likely to introduce new vocabulary related to the new system and result in the decreased use of words related to the old system, which is a diachronic issue. Those born into this society after such a change has taken place will learn the vocabulary that reflects the culture at that time. If we look at this from a

synchronic standpoint, the child may be assisted in becoming familiar with the economic system of his culture through the vocabulary then in use. At this point in time, we may say that language influences culture in that it reinforces the existing cultural values. If we were to test the linguistic relativity hypothesis in this setting, we can easily see the methodological problems encountered in trying to separate language from culture. Since language is a subcategory under the larger, generic category of culture, the attempt to separate language and culture results in a kind of artificiality similar to defining the concept of "dog" apart from its animalness. Thus the complete separation of language from culture cannot be accomplished in testing the linguistic relativity hypothesis in a natural setting. Only an approximation can be hoped for through the design of the experiment.

2. McNeill's classification according to strength of claim

In the preceding section, the need for a distinction between diachronic and synchronic interpretation of the hypothethesis was pointed out. It was emphasized that the linguistic relativity hypothesis is a mold theory, concerned with the effect of language on its speakers in a synchronic setting. Let us now review the claim the hypothesis makes within the mold theory. According to McNeill's classification (1965; Miller & McNeill, 1969), there are three versions of the hypothesis, depending on the strength of the claim. The strong version claims that language has determining influences on thought, the weak version on perception, and the weakest version on memory.

The "strong" version claims that linguistic categories lead to the creation of cognitive categories. However, once these cognitive categories have developed, the cognitive system becomes independent of the linguistic system, in that the cognitive categories are used even when linguistic

performance is not involved at the time one is engaged in cognitive categorization. The classic study by Carroll and Casagrande (1958) appears to have been an attempt to test this claim. Their study compared Navaho-dominant and English-dominant Navaho children in a matching experiment. The linguistic feature involved was the classifier which is an obligatory infix in verb phrases of handling. The choice of the classifier is determined by the nature of the object being handled. It was hypothesized that the criteria for determining the classifier, such as whether the object is long and flexible, or long and rigid, or flat and flexible, would also be used as the basis for determining similarity between two objects. In other words, it was expected that these linguistic categories of the classifiers had become cognitive categories for the Navaho-dominant children, and that they would use these categories in the matching task even though no sentences were being uttered to make them consciously aware of these categories.

The "weak" version of the hypothesis asserts that verbalization increases the availability of perceptual or conceptual attributes encoded by the language. That is, if the language requires, as in the case of Navaho, that one use a specific suffix in certain grammatical constructions according to the shape and form of the object, then the speaker of that language will come to pay more attention to these attributes that are encoded in the language than otherwise. Thus verbalization elevates the saliency or availability of certain perceptual attributes during the performance of some non-linguistic task, such as in matching objects according to some similar attributes in the above experiment. The essential difference between the "strong" and "weak" versions of the hypothesis is whether producing speech, overtly or covertly, during the performance of some non-linguistic task,

results in the classification based on the attributes encoded in the language.

Which claim one can make, I think, depends to a large extent on whether the particular perceptual attribute is encoded in just one grammatical construction or is pervasive in a number of grammatical or semantic features. For instance, in Japanese there are counters or classifiers that require attention to the shape and other aspects of objects, very much like in Navaho. Long, stick-like objects have the morpheme -hon suffixed to the numeral, flat thin objects -mai, and sheets of paper in bound form with writing on them -satu. Human beings, birds, insects and other animals all require different classifiers. One would count sheets of paper one-mai, two-mai, three-mai, but magazines one-satu, two-satu and so on. Now if I were a subject in an equivalence grouping experiment, and were asked which two items are more similar among three objects: a pillow, a mattress and a sheet of paper, I am not likely to classify the mattress with the sheet of paper, both of which require the classifier -mai for flat thin objects, while the pillow requires a different classifier. The similarity between the mattress and the sheet of paper may not occur to me at all until I had to count. Unless there were more than one each of the three items, and I had to count, the classifier may not have entered into my mind at all. Even then, it is quite likely that I would simply count the number of each object by some abbreviated method, like two, four, six, eight, ten, or five, ten, fifteen and so on, and only at the end say, "There are eleven-mai mattresses, seven-ko pillows and 16-mai paper." Whether even at this point I will become aware of the similarity is still questionable. Most likely I will become aware of the issue at hand only after two or three sets of such problems had been answered. Many of the equivalence grouping experiments tend to

be of this type, where the role of language is likely to be minimal, so that even the "weak" version of the linguistic relativity hypothesis may not be supported.

In contrast, the honorifics in Japanese are found in both grammar and lexicon. The perceptual attribute that is criterial here is the status relationships between the speaker and the addressee and between the speaker and the person being talked about. The status relationship determines: (1) the choice of pronoun "you", which has a finer gradation than the vous-tu distinction (Brown & Gilman, 1960), (2) the first person pronoun, (3) a large number of nouns and verbs as lexical items, (4) noun prefixes and suffixes, (5) verb phrases, and (6) sentence endings. A pervasive pattern like this is more likely to affect the cognitive processes of the speaker and thus support the strong version of the linguistic relativity hypothesis. The importance of the distinction between attributes that are used only in relation to one set of lexical items and those that recur in a number of sets and thus form a pattern is an important one, to which I will return later.

The "weakest" version of the hypothesis in McNeill's classification asserts that language shows its effect mainly in memory. A representative study here is the one by Brown and Lenneberg (1954) on perception and recognition of colors. The study showed that codability, an index based on four different measures and correlated with how easily the color was codable by a single-word label, was related to accuracy of memory. Reviewing all the studies on codability, carried out mainly by Lenneberg and Lantz's group, McNeill (1965; Miller & McNeill, 1969) points out that the verbal labels assist memory only when the task of remembering is demanding, such as when one has to remember several colors over a longer period of time.

When only one color is involved, one can rely on visual memory without using a verbal label, and hence, if any verbal label is used at all, whether a ready-made label provided in that language or a long phrase made up by the subject, the linguistic code is not likely to affect memory. Thus the weakest version of the hypothesis states that memory is affected by language only to the extent that information is stored in memory via a linguistic code. McNeill, however, stresses that this version of the hypothesis can have powerful consequences for cognition. To quote him from his 1965 paper (but deleted in the 1969 Miller & McNeill version), "Language would influence cognition, not because thought is patterned after language, nor because perception is influenced by language, but because thought feeds on language, using it as a most valuable tool for the representation of information."

3. Fishman's schematization

While McNeill's classification is based on what aspect of cognitive processes is influenced by language, and thus emphasizes the dependent variable or the intervening variable, depending on the sophistication of the design of the experiment, Fishman's systematization of the linguistic relativity hypothesis (1960) is based on both independent and dependent variables, and thus may be considered a classification based on methodology. Fishman represents the typology of studies on the hypothesis as a two-by-two matrix. One factor is divided into lexical and grammatical structure of the language, the second factor is divided into linguistic and non-linguistic data. The first factor is the predictor or independent variable and refers to the specific language characteristic, either lexical or grammatical, that is the focus of the study. The second factor is the criterion or dependent variable, and refers to the data that will be related to the particular

characteristic of a given language under study. Linguistic data include

Predictor (Independent Variable)	Criterion (Dependent Variable)	
Data of Language Characteristics	Data of (Cognitive) Behavior	
	Language data	Non-linguistic data
Lexical or "semantic" characteristics	Level 1	Level 2
Grammatical characteristic	Level 3	Level 4

Figure 1. Fishman's schematization of the Whorfian hypothesis (1960)

cultural themes expressed through the medium of language, such as written anecdotal accounts and reports of anthropological observations. Non-linguistic data include classificatory behaviors like matching, grouping of objects, and so on.

The left half of the matrix that uses linguistic data as the criterion of behavior essentially relates to the diachronic aspect discussed earlier. It deals mainly with the language-culture relationship. Many of Whorf's own examples fall into this side of the matrix. For instance, Whorf finds that a number of grammatical features in the Hopi language, such as lack of tense, classification of events into parts of speech according to the length of duration, and a few others, are congruent with the Hopi's way of perceiving the world as timeless and unchanging (Whorf,1940 in Whorf, 1956). This is an account of the relationship between the grammatical features of a language and world-view. The world-view, however, was not assessed through individual responses, but was based on Whorf's own impressionistic observation. It is a culture theme that Hymes calls a cultural habit, as mentioned earlier in this paper. Because the account points out only cultural correlates of

linguistic features and does not establish a causal relationship, we might say that Whorf's own examples do not fall in the realm of the linguistic relativity hypothesis in the strict sense.

The right half of Fishman's two-by-two matrix deals with non-linguistic behavior data in relation to either lexical or grammatical features of the language. This half is essentially concerned with individual behavior as opposed to the other half's concern with the abstract group behavior expressed as culture. If we were to revise the dichotomy of the criterion variable to read group-culture data vs. individual data, instead of language data vs. non-linguistic data as Fishman originally had it, we would have a more clear-cut systematization in terms of methodology. Most of the anthropological studies dealing with the relationship between language and culture would still fall under group-culture data, while all controlled psychological experiments would fall under individual data. Both would be subdivided into two categories according to whether the predictor variable is some lexical or grammatical feature of the language. Since my concern is with the effect of language on its individual speakers' cognition, I will disregard the left half dealing with the language-culture relationship and review studies that fall into either one of the two cells dealing with individual data.

Fishman refers to the cell that uses lexical features as the predictor variable as Level 2. It includes all the codability studies so far which attempt to evaluate the effects of vocabulary on recognition, recall and learning. The study by Carmichael, Hogan and Walter (1932) on reproduction of visual stimuli presented with verbal labels is another study falling in this cell at Level 2. There are also a number of matching or equivalence grouping experiments, such as Carroll and Casagrande's Experiment 1 (1958), where English speaking and Hopi speaking children were compared in the way they matched two pictures out of a set of three based on meaning or labels,

and Greenfield, Reich and Olver's study (1966) with children in Senegal, Africa. Actually, the majority of psychological studies on the linguistic relativity hypothesis are at Level 2, using the meaning of words as the predictor. The reason for this will become clear when we discuss Level 4.

Fishman considers Level 4, which uses grammatical features as the predictor, as the most demanding of all, for it requires technical training at both the predictor and the criterion ends of the relationship. In other words, unless the researcher is trained both in linguistics and psychology, or a linguist and a psychologist cooperate in finding a problem and designing the experiment, a study at Level 4 is difficult to carry out. For this reason, Level 4 is also considered to be the strongest in terms of conceptual and methodological sophistication. At the time of Fishman's writing of this article in 1960, Carroll and Casagrande's Experiment II (1958), which used the Navaho classifiers as the predictor variable was the only one at this level. Since then, Ervin did a study on the connotation of gender (1962), using nonsense Italian sounding words as stimuli for Italian speaking subjects. All the words had the form of nouns, half of them having masculine gender endings, half feminine gender endings. Subjects were asked to rate each nonsense noun on four Semantic Differential scales that are highly correlated with the masculine-feminine dimension. The results showed that feminine gender nouns tended to be rated as feminine, and masculine gender nouns as masculine, thus supporting the linguistic relativity hypothesis. A third study at this level is my large scale cross-cultural study on the perception of interpersonal behavior using the adversative passive in Japanese as the predictor (Niyekawa 1968, Niyekawa-Howard, 1968). Whether a fourth one will soon appear is rather doubtful. With the popularization

of the theory of generative grammar, it has now become fashionable to talk about linguistic universals rather than about linguistic relativity. Does the acceptance of one necessitate the rejection of the other?

4. Linguistic universals and linguistic relativity

Language is an extremely complex phenomenon. Linguists are only beginning to recognize how intricate and complicated are linguistic rules and structures. The grammar internalized by the speaker-hearer is a system of many hundreds of rules of different types that are organized according to certain fixed principles of ordering and applicability. Some of these rules are particular and idiosyncratic to his specific language, while the general principles by which his grammar is organized are common to all languages and therefore universal. Yet despite the enormous complexity of the grammar, language is established around age four in normal children (McNeill, 1966a, 1966b). According to Lenneberg's studies, even children whose IQ at age 12 is 50, and who by the time they are 20 years old have an IQ of only 30 are "completely in possession of language, though their articulation may be poor and an occasional grammatical mistake may occur" (Lenneberg, 1964, p.80). This suggests that the species-specific language capacity is independent of intelligence (Lenneberg, 1964, 1967). It is on these grounds that Chomsky revived Humboldt's theory that there is a system underlying any human language that is universal which expresses man's unique intellectual attributes. Humboldt considered language to be a kind of latent structure in the human mind that develops from within in an essentially predetermined way by exposure to specific linguistic expriences. In supporting Humboldt and the rationalist view, Chomsky is essentially taking the position that language development is a maturational process dependent on appropriate

environmental conditions. In other words, how language is learned is universal, but what is learned is language specific. Since universal grammar and particular grammar deal with different levels of abstraction, they are not mutually exclusive, but rather interlock with each other. Thus there is no reason to assume that linguistic universals negate the linguistic relativity hypothesis.*

There is a tendency among those who accept the innateness theory and linguistic universals as expressed, for example, in Chomsky's Cartesian Linguistics (1966) and Language and Mind (1968) to assume that this view precludes acceptance of the linguistic relativity hypothesis.

Lenneberg may be considered one such person. Unlike those who accept linguistic universals without knowing much about linguistic relativity, Lenneberg was the first person to carry out a well-controlled psychological experiment on the linguistic relativity hypothesis. His 1954 article with Brown gives a detailed explanation of the linguistic relativity hypothesis. Since then, Lenneberg has carried out a number of studies on the language of the mentally retarded and the deaf. He has gradually changed his position and now rejects the hypothesis on the basis of physiological evidence that supports linguistic universals (1967). It is worth noting that in rejecting the hypothesis, Lenneberg has given it a redefinition. From the moderate definition in 1954 that emphasized the salience of selective perceptual categorization due to "words" used in different languages, he has come to interpret the linguistic relativity hypothesis to mean that different languages "exert restrictions upon an individual's freedom of conceptualizing" (1967,p.334).

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* In personal conversation in 1968, Chomsky concurred that the linguistic relativity hypothesis is not contradicted by the assumption of linguistic universals.

To understand his turn-about, it is appropriate to examine the chapter devoted to "language and cognition" in his 1967 publication Biological Foundations of Language.

Lenneberg explains cognition as follows. Most animals organize sensory data by a process of categorization, which is grouping objects as similar or functionally equivalent on the basis of some criteria. Two additional processes are differentiation and interrelation or transformation. What differentiates man from animal is the use of words by man in these cognitive processes, which he refers to as naming. Words used in naming, however, are not static, but dynamic. The word "house", referring to a structure used as shelter for men, animals or objects, is easily extended metaphorically or quasi-metaphorically to expressions like House of Lords, house of cards, house of God, etc. "The ease with which the criterion for categorization may be changed and the naturalness with which we understand such extensions point to the fact that categorization is a creative process of cognitive organization rather than an arbitrary convention" (p.333).

Only brief reference is made to syntax. Morphemes such as -ing, and $-s_{pl.}$ are like words by, for, etc. They are relational categories, and "the semantics of these relational elements perhaps illustrate best how words do not refer to real things but to cognitive processes" (p.336). Syntax and phonology are thus seen as part of the categorization process unique to humans, with which I would agree. However, the dynamic and creative aspect of cognitive processes applied to words cannot apply to syntax and phonology as easily. Yet when examining the language-cognition relationship, he restricts his discussion to lexical-semantic studies. In fact, the review is narrowly limited to studies on color naming on grounds that studies on language and cognition should be based on words with simple referents to

sensory data, whose physical properties can be objectively measured. Reviewing studies in this area, including studies of the deaf and the mentally retarded, Lenneberg rejects the linguistic relativity hypothesis. He states, "Languages tag some selective cognitive modes but they differ in the selection. This selectivity does not cripple or bind the speaker" (p. 365), because of the speaker's freedom in choosing words.

If the claim of the linguistic relativity hypothesis is to be understood as "crippling or binding the speaker," nobody would argue with Lenneberg in rejecting the hypothesis. However, such an extreme version of the hypothesis can hardly be considered an interesting hypothesis because of its unquestionable unacceptability to any scholar. Since it is this version of the hypothesis that Lenneberg rejects, while still acknowledging the selectivity in cognition due to difference in languages, one could say that his turn-about is just a shift in emphasis.

His position that the relationship between language and cognition cannot be experimentally investigated except with words for sensory experience is refuted in the following section on conceptual problems.

5. Conceptual problems

Some of the psychologists who have lost interest in the linguistic relativity hypothesis have done so, it seems, because of premature conclusions based on experiments that lack in conceptual sophistication. There are two important conceptual issues that have been neglected by most of the studies so far. One has to do with the nature of linguistic habits. These are acquired unconsciously, and remain unconscious. That these are unconscious has been emphasized by Sapir and Whorf, as well as Chomsky. Yet most studies have used linguistic features that are at the conscious level,

such as meaning of words. The other issue has to do with patterns of attributes rather than attributes found in a single set of words. I pointed out earlier in this paper that something as pervasive as the Japanese honorific is likely to affect cognition more than a feature found in a simple set of lexical items. Both the unconscious aspect and patterns are more strongly related to the grammatical aspects of the linguistic relativity hypothesis, which have been grossly neglected as was evidenced by the paucity of studies at Level 4 in Fishman's schematization. Whorf emphasized the structural, that is, grammatical aspects of language more and more in his later years, as the following statements, written shortly before his death in 1941, indicate.

> Because of the systematic configurative nature of higher mind, the 'patternment' aspect of language always overrides and controls the 'lexation' (Nāma) or name-giving aspect. Hence the meanings of specific words are less important than we fondly fancy. Sentences, not words, are the essence of speech, just as equations and functions, and not bare numbers, are the real meat of mathematics (Whorf, 1956, p.258).

> . . . language consists of discrete lexation-segmentation (Nāma-Rūpa) and ordered patternment, of which the latter has the more background character, less obvious but more infrangible and universal . . . (Whorf, 1956, p.269).

We should note here that the "patternment" found in grammar is unconscious and therefore serves as background character. This is also emphasized by Sapir. Sapir points out that the ability to distinguish between the use of to fall and to fell (to cause to fall) among English speakers, or between hangen (to hang, be suspended) and hängen (to hang, to cause to be suspended) among German speakers does not require an ability to conceive of causality as such. The latter ability, he maintains, "is conscious and intellectual in character; it is laborious, like most conscious processes, and it is late in developing." On the other hand, the ability to feel and express the

causative relation on hearing or using the causative verb is "unconscious and nonintellectual in character, exercises itself with great rapidity and with utmost ease, and develops early in the life of the race and of the individuals" (Sapir, 1958, p.155). He then goes on to discuss this unconscious orientation as follows:

> We have therefore no theoretical difficulty in finding that conceptions and relations which primitive folk are quite unable to master on the conscious plane are being unconsciously expressed in their language -- and, frequently with the utmost nicety. As a matter of fact, the causative relation, which is expressed only fragmentarily in our modern European languages, is in many primitive languages rendered with an absolutely philosophic relentlessness. In Nootka, an Indian language of Vancouver Island, there is no verb or verb form which has not its precise causative counterpart.
>
> Needless to say, I have chosen the concept of causality solely for the sake of illustration, not because I attach an especial linguistic importance to it. Every language, we may conclude, possesses a complete and psychologically satisfying formal orientation, but this orientation is only felt in the unconscious of its speakers -- is not actually, that is, consciously, known by them (Sapir, 1924, in Sapir, 1958, pp.155-156).

The unconscious aspect of such grammatical features is another reason for the difficulty in finding problems to be tested at Fishman's Level 4.

The idea that grammar should have greater influence on perception and cognition than lexicon, if language is to have any influence on these at all, appears to be sound. The freedom of choice of lexical items in the expression of ideas and concepts is great. When one cannot find the exact word with which to express one's idea, one can always use another related word and modify it with other words, or be creative in other ways as Lenneberg pointed out. The freedom of choice of grammatical construction, however, is restricted. The meaning of words can change over time, new words can be created or borrowed as the need arises, but grammar is slow in changing. The choice of lexical items is carried out at a more conscious plane, and hence is under greater control of the speaker in comparison to choices

made in grammatical constructions, which are almost automatic and unconscious. Because ideas have to be expressed under the constraints of grammar, the relation between language and cognitive processes is likely to be stronger at the grammatical level.

Patterning, however, exists at the phonological and lexical levels of language also. The phonological system of a language is never arbitrary or random, but rather well systematized. A speaker of a particular language comes to selectively attend to only those features which are significant in his own language. Hence, when an English speaker who is monolingual (and not trained in linguistics) is presented with a minimal pair of Chinese words, where the initial consonant is aspirated in one, and unaspirated in the other, he is likely to perceive the difference, if at all, in terms of voicing. The experiment by Brown and Horowitz (Brown, 1956) on the perception of vowel length by English and Navaho speakers or the study of discrimination of speech sounds by Liberman's group (Liberman, 1957; Liberman, Harris & Griffith, 1957) suggests that selectivity in the perception of speech sounds is influenced by the sound pattern of the perceiver's language. At the lexical level, patterns emerge when componential analysis (Goodenough, 1956) is used in the study of folk taxonomy. The semantic components found in folk taxonomy apply to a range of generic terms within a specific domain of culture. In this respect, componential analysis is different from just finding the criterial attributes of one set of generic terms, such as books as opposed to magazines. A study of semantic components in folk taxonomy often reveals that each component is a criterial attribute for a number of sets of generic categories (Conklin, 1955; Frake, 1961). In other words, the semantic components form a pattern. Yet these patterns of semantic

components remain largely unconscious, as do the phonological and grammatical patterns. At the lexical level, then, a study of the relationship of patterns of semantic components to cognitive processes is likely to be more fruitful and meaningful in terms of Whorf's later version of the hypothesis.

The psychological rationale behind the linguistic relativity hypothesis is the principles of selective and distorted perception. It is now well established that perception and memory are selective and distorted. We do not perceive everything that is out there. Rather we selectively perceive certain things and screen others from the mass of stimuli that hit us, thus getting a distorted picture. The distorted percept undergoes further change while it is stored in memory. The change is towards a meaningful whole -- ambiguous stimuli get structured, irrelevant details drop out, relevant points become sharpened, and unfamiliar or neutral objects are assimilated to more familiar ones. However, what is considered to be relevant, meaningful or familiar depends on the individual perceiver's background. Studies have shown that the individual's situational or temporary needs as well as his attitudes and personality are factors contributing to selectivity and distortion.

Gibson, whose theory of perception is information-based, describes the process of perceptual learning as one of learning "what to attend to, both overtly and covertly" (1967, p.270). It involves learning to detect the critical or distinctive features of objects and events and to abstract the general properties. While Gibson focuses his work on the perception of physical dimensions and does not concern himself with social perception, and while he rejects the linguistic relativity hypothesis as interpreted and supported by the behaviorists, one can infer from many of his statements that there are differential effects on perceptual learning due to cultural

differences. He states that "the education of the perceptual system depends mainly on the individual's history of exposure to the environment" (p.268). He also discusses the acquisition of "what might be called economical perception" and considers it as one kind of perceptual development. He defines this as "the ability to avoid distraction -- to concentrate on one thing at a time in the face of everything going on in the environment -- and yet to accomplish as much knowing as possible." In economical perception, "only the information required to identify a thing economically tends to be picked up from a complex of stimulus information. All the other available information that would be required to specify its unique and complete identity in the whole universe of things is not attended to" (p.286). What is attended to are the critical or distinctive features, or the criterial attributes in the theory of Bruner's group (Bruner, Goodnow, & Austin, 1956).

What attributes or features one learns to selectively attend to may be determined or limited to a large extent by the geographical and cultural environment of the individual. While depth perception of the visual field may be universal, the perception of a picture on a two dimensional plane as three dimensional may not be universal. As Hudson's study (1967) in Africa showed, if the child grows up in an environment where no such pictures or diagrams are available, he has not had the opportunity for this type of perceptual learning. Cross-cultural studies on the perception of "optical illusions" by Allport and Pettigrew (1957), and Segall, Campbell and Herskovits (1966) have also suggested the strong influence of cultural and geographic environment in the development of different perceptual inference habits in different societies.

Perceptual learning, like language acquisition, takes place unconsciously and naturally while the individual is growing up, and is not accomplished

through training. The distinction between unconscious and conscious learning needs to be emphasized. Hence, one should not conclude that culture or language determines perception to such an extent that bias in selectivity cannot be corrected. There are enough studies on discrimination learning to indicate that with training, one can achieve much finer discrimination and develop new abilities. Tuning the piano, tasting wine, and detecting counterfeit bills by touch are examples of the countless ways in which special discrimination abilities are developed.

The unconscious habits in selective and distorted perception, whether developed through personal needs, or the influence of culture or language, are best revealed when the stimuli are ambiguous or complex so that perceptual inference or organization is required. This is exactly the rationale behind projective tests. When the stimuli are well structured and leave little room for inference, we do not expect much distortion. Yet the most rigorous studies in terms of experimental design on the linguistic relativity hypothesis so far have used linguistic features, mainly lexical, related to structural aspects of the stimuli, such as dimensions of color, shape, or size of visual objects, partly due to Lenneberg's influence (cf. Lenneberg & Roberts, 1956; Lenneberg, 1967). The non-linguistic tasks were also of judgmental nature where the subject would be expected to be objective and scientific. Little room has been left in most of these tasks for the unconscious habits to operate. A greater amount of selectivity and distortion may be expected in perception and memory of interpersonal behavior situations, which are less structured and which allow for greater freedom of organization and interpretation by the individual.

The importance of the unconscious nature of habit, here the linguistic competence or knowledge of the speaker, cannot be overemphasized. Consider

the following case. In the Villa Aztec dialect of Zapotec, spoken in one part of Mexico, it is obligatory to distinguish between actions which occur for the first time with particular participants and those which are repetitious. In other words, one cannot complete a sentence that describes an action without making a choice whether that particular person is engaged in that action for the first time or not. Nida (1959) points out the problems encountered in translating the Bible into this language. For instance, with the sentence "Jesus visited Capernaum," the translators were forced to decide whether or not Jesus had visited Capernaum previously. One would expect speakers of this language to be more sensitive to clues that suggest whether people are doing something for the first time or not.* Yet they are not aware that they are constantly making such a decision in uttering sentences. Psychological investigations into the relationship of language and cognition have tended to overlook such unconscious decisions required in expressing ideas within the framework of the speaker's grammar.

6. Methodological problems

Besides the conceptual problems discussed above, there are a few methodological problems in a number of studies. One has to do with the stimulus material being used in cross-cultural studies. The point I want to make here is that the stimulus materials have a very strong ethnocentric bias. For instance, the pictures used in the study with children in Senegal (Greenfield et al., 1966) included a car, a bicycle, a clock, and other

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* It is likely that one of the two categories, probably the non-repetitious category, is unmarked, and that when one has no knowledge of the past, the unmarked category is used. However, the existence of an unmarked category does not imply that one can ignore this feature and be sloppy in the use of the unmarked category.

objects that are common to all Western cultures, but not necessarily so to non-Western cultures. In fact, some of the unschooled subjects could not even identify familiar objects in the pictures because they had not been exposed to pictorial representation of objects. The study by MacClay (1958), related to Carroll and Casagrande's experiment with Navaho children (1958), also used test materials consisting mostly of objects familiar to American culture. This has serious implications for the validity of the study, since according to Hymes, "Navaho has no perfect fit between formal classes and semantic patterns; its round-object class of verb stems is notorious for assimilating acculturational items" (1961, p.328), yet it was this linguistic feature that was used as the predictor variable in MacClay's study.

Another methodological problem is the nature of the sample. Greenfield et al. (1966) emphasize the tremendous impact education has in the behaviors tested in their experiments. The differences between urban and rural Mexican children, suburban Boston and lower class American children, and schooled and unschooled children in Senegal, were all similar in nature, while all urban children showed some common characteristics across cultures. They attribute this to the influence of written language, through education, on the children's cognitive processes. Another influence formal education has, especially in urban areas, is familiarization with test taking, and developing an objective attitude in taking tests. This was not mentioned by them, but it is an important point to remember in interpreting results of the experiment. We may thus say that education has a homogenizing effect in terms of cross-cultural differences. Whatever influence any particullar language may have on the cognitive processes of the children speaking that language, formal education minimizes and corrects such effects by educational methods and curricula developed in Western cultures. The influence of

language on cognitive processes then are expected to show more clearly among uneducated people than among those attending schools. Yet because of practical considerations, most psychological studies use school children or college students as subjects, who have been trained to be objective and scientific, especially in test situations. There is little room for the unconscious to show its effect in such a situation.* I am not saying that experiments using school children or college students are not valid. What I want to emphasize is that the nature of the sample should be borne in mind in interpreting experimental results. Many of the studies not supporting the linguistic relativity hypothesis cannot be assumed to disprove the hypothesis, if the experiments are weak in conceptualization, experimentation and interpretation.

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* The difference between a casual and spontaneous response in an informal situation and an objective response in a formal classroom situation is exemplified in the following. I have asked native speakers of Japanese how one would translate the following two sentences into natural Japanese.

> My teacher visited me yesterday afternoon.
> My nosy neighbor visited me yesterday afternoon.

Over a cup of coffee or a meal, the first sentence consistently gets translated into the active, the second into the passive, due to the feature of the Japanese adversative passive (See Howard, 1968a, 1968b, 1969). In formal classroom situations, the translation followed closely the English syntax, both types of sentences put in the active, despite the fact that the instruction emphasized translation into natural Japanese. A situation resembling any setting in formal education, whether a one-to-one interview or testing situation or a classroom situation, seems to provide the student with a mental set for taking an examination. He becomes oriented towards doing well by trying to be objective and accurate. Translation of the second sentence into the passive in Japanese would be considered incorrect in a test of translation in an English course.

7. Summary

The keen interest in the linguistic relativity hypothesis in the 50s that was partly responsible for establishing the field of "psycholinguistics" appears to be withering and almost dying at present. Two major reasons for this were given. One is the erroneous assumption that acceptance of linguistic universals requires the rejection of linguistic relativity. It was pointed out that the two are not incompatible. The other reason is that negative experimental findings on the hypothesis have convinced some that the hypothesis can be rejected, while others have given up the idea that the hypothesis can be tested. Negative findings were attributed to lack of conceptual sophistication in the choice of the linguistic feature to be examined, and poor methodology in carrying out the experiment.

The psychological principles of selectivity and distortion in perception constitute the most supportive rationale for the linguistic relativity hypothesis. Unconsciously acquired habits operate to enable the individual to function effectively in his own linguistic and cultural environment. The patterns that he has learned to selectively attend to, and which thus become salient in his thinking, would differ according to the language he speaks and the culture of that linguistic community. It was emphasized that grammar is likely to have greater influence on the cognitive processes than lexicon, unless features of semantic pattern rather than "words" are considered for the latter.

I have also tried to separate the language-culture relation from the language-cognition relation. When cultural correlates of some linguistic features are found, it is hard to establish causal relationship. A change in one stimulates change in the other, and this interaction

repeats itself over a period of time in the history of each society. I have therefore referred to the language-culture relation as a diachronic problem as opposed to the synchronic nature of the language-cognition relation. An infant is born into a community with an already existing language, and it is this language that he will use as the guide in learning to categorize things around him. Since the linguistic relativity hypothesis stipulates a causal relationship between language and cognition, only the synchronic aspect can be considered to be relevant to the hypothesis.

It is necessary to give a more qualified and restricted definition to the linguistic relativity hypothesis for it to be meaningful. There are a number of factors that influence the individual's perception and cognition, such as the individual's neurophysiological makeup, cultural and geographic environment, personality, situational or temporary needs, and education. Language is only one of these factors, but by no means an insignificant one. Its significance lies in the fact that it serves as a structural framework by which all children categorize objects and events around them during their formative years.

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